

somewhat of a vagrant, there is no improbability of her being subject to so much regularity of habit, and indeed such has been asserted as an observed fact. If, then, this be so, there is every probability of her offspring inheriting the same habit, and the daughter of a Cuckoo which always placed her egg in a Reed Wren's or a Titlark's nest doing the like." To this Mr. Harting very justly replies—"This would be an excellent argument in support of the theory (of Dr. Baldamus) were it not for one expression, upon which the whole value of the argument seems to me to depend. What is meant by the expression 'Once successfully deposited?' Does the Cuckoo ever revisit a nest in which she has placed an egg and satisfy herself that her offspring is hatched and cared for? If not (and I believe such an event is not usual, if indeed it has ever been known to occur), then nothing has been gained by the selection of a Reed Wren's or Titlark's nest (as the case may be), and the Cuckoo can have no reason for continuing the practice of using the same kind of nest from one season to another." Mr. Harting therefore rejects the application of this principle in the case of the Cuckoo. We will suggest to him a modification of Prof. Newton's argument which may perhaps lead him to return to it in its modified form. The assumption that the bird which once successfully deposited her eggs in a Reed Wren's or Titlark's nest, would again seek for one of the same species in other seasons because of her *sagacity*, or her knowledge of its successful hatching, is highly improbable in our estimation, and not essential for the subsequent deductions, in a Darwinian point of view. It is more logical to suppose that ancestral Cuckoos deposited their eggs broadcast. That those which got into Reed Wren's and Titlark's nests (as in instances) all, or nearly all, hatched out; whilst those deposited elsewhere perished. The young *inherited* those peculiarities of the mother birds whose tendency was towards the utilisation of the Reed Wren's and Titlark's nests, and as a result the modern Cuckoo tends to place its eggs in those nests.

The evidently genuine sketch made by Mrs. Blackburn of the nestling Cuckoo ejecting the young of the Titlark along with which it was hatched, first published in the introduction to Gould's "Birds of Great Britain," is introduced as confirmatory evidence in favour of this, to the foster-brethren, murderous propensity of the young birds, with reference to which so many naturalists are still sceptical.

The peculiarity in the distribution of the Nightingale in this country is difficult to explain, especially as the Wryneck keeps within nearly the same boundaries. "When we find this bird in summer as far to the westward as Spain and Portugal, and as far to the northward as Sweden, we may well be surprised at its absence from Wales, Ireland, and Scotland; and yet it is the fact that the boundary line, over which it seldom if ever flies, excludes it from Cornwall, West Devon; part of Somerset, Gloucester, and Hereford; the whole of Wales (*a fortiori* from Ireland), part of Shropshire, the whole of Cheshire, Westmoreland, Cumberland, Durham, and Northumberland." From these data it is not difficult to recognise that with but few exceptions the Nightingale only visits those parts of this country which are covered with secondary or tertiary geological formations; and it

has always seemed to us that it must be that the primary soils do not produce food suitable for the insects on which it feeds. It is true that the new red sandstone is the soil of Cheshire, and that much of Yorkshire and Derbyshire are primary formations, nevertheless the two boundaries are so similar in other respects that it is hardly possible that there is no relation between them.

There is another disputed point to which the author more than once alludes. He remarks that "we cannot help thinking that the Nightingale and many other birds which visit us in summer and nest with us, must also nest in what we term their winter-quarters; otherwise it would be impossible, considering the immense number which are captured on their first arrival, not only in England, but throughout central and southern Europe, to account for the apparently undiminished forces which reappear in the succeeding spring." The late Mr. Blyth was of an opposite opinion, and further observations are necessary before this question can be settled.

Besides the information given on subjects like the above, the nest and eggs of all the species, fifty in number, are described; whilst exact measurements are included of closely allied forms, such as the Wood Warbler, the Willow Warbler, and the Chiff Chaff; the Red Warbler, the March Warbler, &c. Their plumage and nests are also compared in detail.

To those who reside in the country and are fond of the study of nature, this work by Mr. Harting will be found as useful an addition to their libraries or their drawing-room tables, as it will be to ornithologists generally.

OUR BOOK SHELF

Meteorology of West Cornwall and Scilly, 1871 and 1874.
By W. P. Dymond. (Reprinted from the Annual Reports of the Royal Cornwall Polytechnic Society, Falmouth.)

IN the latter of these pamphlets Mr. Dymond gives an interesting discussion of the temperature range corrections for Falmouth, and an excellent *résumé* of the sea-temperature observations made at the same place during the three years 1872-73-74, which have been made with a just apprehension of the precautions which require to be taken, if observations of sea temperature are to have real scientific value. The omission of tables of daily maximum and minimum atmospheric pressure, which were given in the earlier issue, is a decided improvement; not so, however, is the omission of the table of the amounts of the rainfall, with the different winds, N., N.E., E., &c., which supply information of great value in defining local climates.

The five stations reported on are Scilly, Helston, Falmouth, Truro, and Bodmin, of which the most northern, as well as most elevated, is Bodmin. If we compare the mean temperatures of the stations for 1874, it is seen that at Bodmin the mean was 53°·3, and at Falmouth only 51°·8. In some of the months the discrepancy is still greater. Thus the mean temperature of Bodmin is about four degrees higher than that of Falmouth in each of the months from April to July inclusive, and about two degrees higher than at Truro, Helston, or Scilly. It is unnecessary to remark that these differences do not represent the differences of the climates of these places, but are to a very large extent only due to the incomparable modes of observation and of reduction of the observations adopted for the several stations. Thus, as regards the exposure of the thermometers, at Bodmin they are hung four-and-a-half feet above the ground, under a thatch

roof, facing north; at Truro they are placed on the roof of the Royal Institution, about forty feet above the ground, in a wooden shed through which the air passes freely; at Falmouth they are eleven feet above the ground, close to a wall, and in a confined situation; at Helston we are not informed how they are placed; and at the Scilly station we are only told that they "are well placed"—a statement which the observations themselves render very doubtful.

The times of observation are hourly at Falmouth, 9 A.M. and 3 and 9 P.M. at Helston, and as respects the other three stations we have no information. In reducing the observations, "corrections for diurnal range" are used in some cases, though the observations themselves show that the range corrections adopted are plainly not even approximately correct for the place.

A system of meteorological observation which would furnish the data for an inquiry into the important question of a comparison of the local climates of Cornwall requires yet to be instituted. Such a system must secure at each of the stations included within it, uniformity in exposure of instruments, uniformity in hours of observation, and uniformity in methods of reducing the observations. Till this be done, such climatic anomalies, as we have pointed out in the case of Bodmin, will continue to be published, certainly misleading some, and probably leading others to dispute the usefulness of meteorological observations.

We have much pleasure in referring to the additional meteorological information given in the tables, which is often of considerable value, particularly that supplied for Helston by Mr. Moyle, whose tables have the merit of giving the results for the individual hours of observation, as well as deductions from these.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

Vibrations of a Liquid in a Cylindrical Vessel

IN NATURE for July 15, there is a short notice of a paper read before the Physical Society by Prof. Guthrie on the period of vibration of water in cylindrical vessels. It may be of interest to point out that the results arrived at by Prof. Guthrie experimentally, and many others of a like nature, may also be obtained from theory.

In the first place the fact, that the period of a given mode of vibration of liquid in a cylindrical vessel of infinite depth and of section always similar to itself (e.g. always circular) is proportional to the square root of the linear dimension of the section, follows from the theory of dimensions without any calculation. For the only quantities on which the period τ could depend are (1) ρ the density of the liquid, (2) g the acceleration of gravity, and (3) the linear dimension d . Now as in the case of a common pendulum it is evident that τ cannot depend upon ρ . If the density of the liquid be doubled, the force which act upon it is also doubled, and therefore the motion is the same as before the change. Thus τ , a time, is a function of d , a length, and g . Since g is — 2 dimensions in time, $\tau \propto g^{-\frac{1}{2}}$, and therefore in order to be independent of the unit of length, it must vary as $d^{\frac{1}{2}}$ inasmuch as g is of one dimension in length. Hence $\tau \propto d^{\frac{1}{2}} g^{-\frac{1}{2}}$. This reasoning, it will be observed, only applies when the depth may be treated as infinite.

The actual calculation of τ for any given form of vessel involves, of course, high mathematics, the case of a circular section depending on Bessel's functions. But there is an interesting connection between the problem of the vibration of heavy liquid in a cylindrical vessel of any section and of finite or infinite depth, and that of the vibration of gas in the same vessel, when the motion is in two dimensions only, that is everywhere perpendicular to the generating lines of the cylinder. If λ be the wavelength of the vibration in the latter case,* which is a quantity independent of the nature of the gas, and $\kappa = 2\pi \div \lambda$, the period

τ of the similar vibrations in the liquid problem is given by

$$\tau = 2\pi \div \sqrt{\frac{gk \left(\frac{\epsilon}{\kappa} - \frac{\epsilon}{\kappa} \right)}{\epsilon + \epsilon}}$$

l being the depth. The formula shows that in accordance with Prof. Guthrie's observation τ diminishes as l increases, and that when l is sufficiently great

$$\tau = 2\pi \div \sqrt{gk}.$$

If x be the value of k , viz. $2\pi \div \lambda$, for a circular vessel of radius unity, then the values of x for the various modes of vibration are given in the following table extracted from a paper on Bessel's functions in the *Philosophical Magazine* for November 1872.

| Number of Internal Spherical Nodes. | Order of Harmonic. | | | |
|-------------------------------------|--------------------|-------|-------|--------------------|
| | 0 | 1 | 2 | 3 |
| 0 | 3.832 | 1.841 | 3.054 | 4.201 ² |
| 1 | 7.015 | 5.332 | 6.705 | 8.015 |
| 2 | 10.174 | 8.536 | 9.965 | 11.344 |

Thus if d be the diameter of the vessel, the period τ of the liquid vibrations is given by

$$\tau = 2\pi \sqrt{\frac{d}{2gx}};$$

so that if d be measured in inches, the number of vibrations per minute, n , is given by

$$n \sqrt{d} = \frac{30}{\pi} \sqrt{24 \times 32.19 \times x}.$$

For the symmetrical mode of vibration considered by Prof. Guthrie, $x = 3.832$, giving

$$n \sqrt{d} = 519.4$$

agreeing closely with the experimental value, viz. 517.5. Even the small difference which exists may perhaps be attributed to the insufficient depth of the vessels employed.

This mode of vibration is not, however, the gravest of which the liquid is capable. That corresponds to $x = 1.841$, giving

$$n \sqrt{d} = 360.1,$$

and belonging to a vibration in which the liquid is most raised at one end of a certain diameter, and most depressed at the other end. The latter mode of vibration is more easily excited than that experimented on by Prof. Guthrie, but inasmuch as it involves a lateral motion of the centre of inertia, it is necessary that the vessel be held tight.

The next gravest mode gives $x = 3.054$, and corresponds to a vibration in which the liquid is simultaneously raised at both ends of one diameter, and depressed at both ends of the perpendicular diameter. In this case the value of n is given by

$$n \sqrt{d} = 462.7$$

Terling Place, Witham,
July 15

RAYLEIGH

Insectivorous Plants

IF further confirmation be needed of Mr. Darwin's discovery of absorption by the leaves of the *Drosera rotundifolia*, it is afforded amply by the following experiments which I have just concluded:—

Having deprived a quantity of silver sand of all organic matter, I placed it in three pots, which I shall call A, B, and C. In each of these pots I placed a number of plants of the *D. rotundifolia* under the following conditions:—(1) Perfectly uninjured, but washed all over repeatedly in distilled water. (2) Similarly washed, but with all the roots pinched off close to the rosette, and with the leaves all buried, only the budding flower stalk appearing above the sand. (3) Similarly washed, with the roots and the flower stalk left on, but all the leaves pinched off, the roots being buried in the sand. (4) Similarly washed, roots left on, four leaves buried in the sand, two leaves flower stalk, and roots left above the sand and the roots protected against the possibility of their absorbing anything from the sand. All the plants were carefully watched, so that no flies were caught.

* Namely, the length of plane waves of the same period.